

What is claimed is:

1 1. An interleaving method comprising the steps of:  
2 arranging data to be transmitted in a matrix;  
3 and  
4 randomly rearranging at least either columns  
5 or rows of said data and outputting said rearranged  
6 data in time series.

1 2. A de-interleaving method comprising the steps of:  
2 arranging received data having been  
3 interleaved in a matrix; and  
4 randomly rearranging at least either columns  
5 or rows of said data, and outputting said data in time  
6 series, thereby outputting said received data in the  
7 order before said received data was interleaved.

1 3. An interleaving apparatus for interleaving data  
2 to be transmitted, comprising:  
3 a first storing unit for storing data to be  
4 transmitted; and  
5 a first control unit for controlling said  
6 first storing unit so that said data to be transmitted  
7 is outputted from said first storing unit with said  
8 data to be transmitted arranged in a matrix and at  
9 least either columns or rows of said data to be  
10 transmitted randomly rearranged.

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4 memory for holding numbers used as addresses in a
5 predetermined order.
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1 7. The interleaving apparatus according to claim 3,  
2 wherein said first control unit writes said data to  
3 be transmitted in said first storing unit in the order  
4 of addresses, and said first control unit comprises  
5 a first read controlling unit for generating a read  
6 address to be used to read said data to be transmitted  
7 from said first storing unit with said data to be  
8 transmitted stored in said first storing unit arranged  
9 in a matrix and at least either columns or rows of said  
10 data to be transmitted randomly rearranged to read  
11 said data to be transmitted.

1 8. The interleaving apparatus according to claim 7,  
2 wherein said first read control unit comprises a  
3 column number generating unit for randomly generating  
4 column numbers and a row number generating unit for  
5 randomly generating row numbers, and said first read  
6 control unit reads said data to be transmitted from  
7 said first storing unit with numbers generated by said  
8 column number generating unit and said row number  
9 generating unit as said read address.

1 9. The interleaving apparatus according to claim 8,  
2 wherein each of said column number generating unit and

3 said row number generating unit is configured with a  
4 memory for holding numbers used as addresses in a  
5 predetermined order.

1 10. A de-interleaving apparatus for de-interleaving  
2 received data, comprising:

3           a \second storing unit for storing said  
4 received data; and

5           a second control unit for controlling said  
6 second storing unit so that said received data is  
7 outputted from said second storing unit in a state  
8 before said received data was interleaved by arranging  
9 said received data in a matrix and randomly  
10 rearranging at least either columns or rows of said  
11 received data.

1 11. The de-interleaving apparatus according to  
2 claim 10, wherein said second control unit comprises  
3 a second write control unit for generating a write  
4 address to be used to write said received data in said  
5 second storing unit in a state before said received  
6 data was interleaved by arranging said received data  
7 in a matrix and randomly rearranging at least either  
8 columns or rows of said received data to write said  
9 received data, and said second control unit reads said  
10 received data stored in said second storing unit in  
11 the order of addresses.

1 13. The de-interleaving apparatus according to claim  
2 12, wherein each of said column number generating unit  
3 and said row number generating unit is configured with  
4 a memory for holding numbers used as addresses in a  
5 predetermined order.

1 14. The de-interleaving apparatus according to claim  
2 10, wherein said second control unit writes said  
3 received data in said second storing unit in the order  
4 of addresses, and said second control unit has a second  
5 read controlling unit for generating a read address  
6 to be used to read said received data in a state before  
7 said received data was interleaved from said second  
8 storing unit by arranging said received data stored  
9 in said second storing unit in a matrix and randomly  
10 rearranging at least either columns or rows of said

1 15. The de-interleaving apparatus according to claim  
2 14, wherein said second read control unit comprises  
3 a column number generating unit for randomly  
4 generating column numbers and a row number generating  
5 unit for randomly generating row numbers, and said  
6 second read control unit reads said received data from  
7 said second storing unit with numbers generated by  
8 said column number generating unit and said row number  
9 generating unit as a read address.

1 16. The de-interleaving apparatus according to claim  
2 15, wherein each of said column number generating unit  
3 and said row number generating unit is configured with  
4 a memory for holding numbers used as addresses in a  
5 predetermined order.

1 17. An interleaving/de-interleaving system  
2 comprising an interleaving apparatus for  
3 interleaving data to be transmitted and a de-  
4 interleaving apparatus for receiving said  
5 transmitted data interleaved by said interleaving  
6 apparatus to de-interleave said transmitted data,  
7 wherein said interleaving apparatus outputs said data  
8 to be transmitted with said data to be transmitted

1 18. An interleaving/de-interleaving apparatus for  
2 transmitting/receiving interleaved data to/from an  
3 opposite interleaving/de-interleaving apparatus,  
4 comprising:

11 a de-interleaving apparatus for outputting  
12 received data interleaved in said opposite  
13 interleaving/de-interleaving apparatus in a state  
14 before said received data was interleaved by arranging  
15 said received data in a matrix, and randomly  
16 rearranging at least either columns or rows of said  
17 received data.

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